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I, JULIE BILLINGSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2003903713 for a patent by GLOBAL VALVE TECHNOLOGY PTY LTD as filed on 18 July 2003.

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WITNESS my hand this
Thirtieth day of March 2004

J. Billingsley

JULIE BILLINGSLEY
TEAM LEADER EXAMINATION
SUPPORT AND SALES

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AUSTRALIA

Patents Act 1990

Global Valve Technology Pty Ltd

PROVISIONAL SPECIFICATION

Invention Title:

A Valve

The invention is described in the following statement:

A Valve

Field of the Invention

The present invention relates broadly to a valve and relates particularly, though not exclusively, to a sports ball valve. The applicant intends to cognate this application with their earlier filed Australian provisional patent application No. 2003901224 the disclosure of which is included herein by way of reference.

Background to the Invention

Figures 1 and 2 show cross-sectional representations of a sports-ball valve 1. The valve 1 is encased in a casing 2 that is glued or otherwise fixed to an inflatable bladder 3. The valve 1 includes an axially disposed and throughgoing passageway 4 having an expandable but otherwise normally closed valve port 5.

In operation the inflatable bladder 3 is inflated by a manual pump (not shown) to which an injector 6 is threadably connected 4. The injector 6 is, as best shown in figure 2, pushed through the passageway 4 of the valve 1 so that it penetrates the expandable port 5. The valve 1 forms a seal about the injector 5 to limit the escape of air during inflation of the bladder 3.

This conventional sports ball valve 1 suffers from at least the following drawbacks:

1. forcing the injector 6 into the valve passageway 4 and penetration through the expandable port 5 damages the material of the valve 1 resulting in leakage;

2. forcing the injector 6 through the valve 1 when the bladder is deflated is known to puncture the opposing side of the bladder rendering it useless;

3. the injector 6 may during this relatively forceful insertion process or during inflation of the bladder 3 be snapped off within the valve 1; and

4. the sports ball cannot be inflated without an injector which may not always be readily available.

Summary of the Invention

According to one aspect of the present invention there is provided a valve comprising:

a mounting member being adapted to provide for mounting of the valve; and

a valve element connected to the mounting member and being of a conical or frusto-conical shape having its reduced diameter portion directed in a forward flow direction, the valve element including a collapsible aperture located at or adjacent the reduced diameter portion and which in an open condition allows for flow of a fluid in the forward direction through the valve whilst in a closed condition the collapsible aperture prevents flow of the fluid in a reverse direction, the collapsible aperture being opened by the fluid pressure alone.

In the preferred embodiment of a sports ball valve, the ball is inflated without penetrating the valve element or collapsible aperture with an injector and thus damage to the valve element and adjoining components is avoided.

According to another aspect of the invention there is provided a valve comprising:

a mounting member being adapted to provide for mounting of the valve; and

a valve element connected to the mounting member and being of a conical or frusto-conical shape having its reduced diameter portion directed in a forward flow direction, the valve element including a collapsible aperture located at or adjacent the reduced diameter portion and which in an open condition allows for flow of a fluid in the forward direction through the valve whilst in a closed condition the collapsible aperture prevents flow of the fluid in a reverse direction, the valve element being configured to provide opening of the collapsible aperture on application of a predetermined force to the mounting member.

In the preferred embodiment of a sports ball valve the application of force to the mounting member promotes opening of the collapsible aperture for inflation of the ball. The ball may also be partly or fully deflated, typically for the purpose of manufacturing and shipping, by the application of force to the mounting member. In both cases the valve

element or collapsible aperture need not be penetrated by an injector and thus damage to the valve element is avoided.

Preferably the valve includes a stabilisation zone disposed intermediate the mounting member and the valve element and being configured to reduce the likelihood of inadvertent opening of the collapsible aperture on application of operational forces to the mounting member, said forces being less than the predetermined force. More preferably the stabilisation zone includes a peripheral recess at which the cross-sectional area of the valve is reduced. Even more preferably the stabilisation zone is approximately 30 to 80% of the maximum cross-sectional area of the conical-shaped valve element.

Preferably the mounting member is either disc-shaped or in the form of a cylinder connected to and coaxial with the conical or frusto-conical shaped valve element. More preferably the mounting member is formed integral with the valve element wherein the valve is of a one-piece construction.

Preferably the valve of a one-piece construction is formed predominantly of a polymeric or rubber material.

Generally the valve is a sports ball valve or a tyre valve.

Brief Description of the Drawings

In order to achieve a better understanding of the nature of the present invention a preferred embodiment of a valve will now be described, by way of example only, with reference to the accompanying drawings which:

Figures 1 and 2 are cross-sectional views of a conventional sports ball valve;

Figure 3 is a side elevational, sectional and bottom view of a valve according to one embodiment of the invention;

Figure 4 is a sectional, plan and photographic representation of another embodiment of a valve according to the invention;

Figure 5 is plan, elevational and assembly view of a further valve according to the invention;

Figure 6 is an assembly view shown in cross-section of yet another embodiment of a valve of the invention; and

Figure 7 are schematic cross-sectional views of yet further embodiments of valves according to the invention.

Detailed Description of the Preferred Embodiment

As shown in figure 3 there is a valve 10 of one embodiment of the invention which according to this particular aspect is designed to be installed in a sports ball (not shown). This sports ball valve 10 comprises a mounting member designated generally as 12 and a valve element 14.

The mounting member 12 includes a relatively thin disc having an increased wall thickness toward its axis. The mounting member 12 is connected or in this example formed integral with the valve element 14 which is frusto-conical in shape. The valve 10 includes an axially disposed passageway 16 which is throughgoing. The passageway 16 is shaped generally cylindrical at the mounting member 12 and tapers inwardly to form a wedge-shaped portion 18 within the valve element 14. The wedge-shaped portion 18 is then formed continuous with a collapsible and generally rectangular-shaped aperture 20 which extends through the valve element 14 and exits the reduced diameter portion of the cone.

The sports ball valve 10 of this embodiment includes a stabilisation zone in the form of a peripheral recess 22 located intermediate the mounting member 12 and the valve element 14. The peripheral recess 22 is generally circular in cross-section and has a cross-sectional area approximately 50% of that of the maximum cross-sectional area of the valve element 14. The sports ball valve is as such of a bulbous configuration.

In use, the stabilisation zone reduces the sensitivity of the collapsible 20 to external operational forces applied to the ball, for example from bouncing, kicking or passing of the sports ball. The collapsible aperture 20 is thus less likely to inadvertently open as a result of these operational forces which result in pressure loss from the sports ball. It is however possible to deflate the sports ball without the use of an injector by the application of a predetermined and axial force to the valve 10.

The sports ball valve 10 of this embodiment is constructed of a rubber-like material. The valve 10 is of a one-piece construction and the rubber-like material serves to bias the collapsible aperture 20 into a closed condition.

The sports ball valve 10 is fitted to a sports ball or sports ball bladder in a traditional manner where for example it is glued or otherwise adhered to an inner surface of the ball or bladder. The sports ball valve 10 is designed to be used without an injector whereupon the inflating pressure alone of the inflation fluid, most typically air, serves to open the collapsible aperture 20 into its open condition. Otherwise, the collapsible aperture 20 is biased in a normally closed condition. In one example a manual air pump (without an injector) is pressed against the inlet of the passageway 16 and on inflation the inflating fluid which is forced into the passageway 16 expands the collapsible 20 aperture and inflates the sports ball.

Figure 4 illustrates another embodiment of a valve 30 which according to this aspect of the invention is designed to be fitted to an inflatable tyre (either tubed or tubeless). The tyre valve 30 is in this example designed to replace a conventional Schroeder valve. The tyre valve 30 is fitted to a screw-threaded adapter 32 which allows it to be fitted to an existing tyre installation.

The tyre valve 30 is of a one-piece construction and fabricated from a rubber-like material. The valve 30 includes a mounting member 34 formed integral with a valve element 36. The mounting member 34 is generally cylindrical in shape and includes an inwardly directed flange 37 which engages a complementary-shaped recess 38 within the adapter 32. The valve element 36 is a relatively thick walled and conically-shaped member having a collapsible and coaxially located aperture 40.

A bike tyre (not illustrated) to which the tyre valve 30 is fitted, is inflated by the application of inflating fluid pressure to the collapsible aperture 40 so as to expand it and inflate the tyre. The adapter 32 includes an inlet port 42 to which inflating fluid pressure is applied for opening of the collapsible aperture 40. The adapter 32 is designed for connection to a standard inflation coupling (not shown) to which a pneumatic air supply is connected. The tyre valve 30 is thus actuated by the inflating fluid pressure alone without the need for an injector.

As shown in figures 5 and 6 there is a valve 50 and 60, respectively, which rely upon fluid pressure alone for their actuation. The valve 50 of figure 5 includes a mounting member in the form of a cylindrical-shaped housing 52 which houses a valve element in the form of a conical-shaped and coaxially disposed diaphragm 54. The conical-shaped diaphragm 54 includes a collapsible aperture 56 which is a slit formed at the apex of the diaphragm 54. The valve 60 of figure 6 is similar to that of figure 5 except that it includes a pair of conical-shaped diaphragms 64 and 64' located adjacent to one another. In both examples the valves 50 and 60 are coaxially mounted within a flow line or fitting associated with the flow line designated generally as 58 and 68, respectively.

As shown in figure 7 there are further examples of a valve such as 70 which are preferably in the form of sports ball valves. These are essentially variants of the sports ball valve 10 of figure 3 but without the stabilisation zone or periphery recess 22. The alternate sports ball valves 70 each include a mounting member designated generally as 72 connected to and in this example formed integral with a valve element 74. The mounting member 72 is a disc-shaped member and is connected coaxially with the valve element 74 which is conical in shape. The valves 70 each include a throughgoing and axially located passageway 76. The passageway 76 includes a cylindrical portion located at the disc-shaped mounting member 72 and extending into the valve element 74 whilst being formed continuous with a collapsible aperture 78. The collapsible aperture 78 exits the conical-shaped valve element 74 at its apex.

The valves 70 of figure 7 are similarly designed to be inflated relying on the inflating fluid pressure alone without the need for an injector. In a similar manner to the described inflation of the sports ball valve of figure 3, these alternate sports ball valves 70 are inflated by applying the manual inflation pump (or other inflation means) to the sports ball so as to apply sufficient fluid pressure to the passageway 76 to expand the collapsible aperture 78. These ball valves 70 are also designed so that application of a predetermined and axially directed force to the mounting member 72 (as schematically depicted by the pair of vertical and parallel lines) promotes opening of the collapsible aperture 78. The predetermined force is relatively high and exceeds that which may under normal working conditions be applied to the sports ball when it is bounced, kicked or passed. This application of the predetermined force to the mounting member 72 promotes opening of

the collapsible aperture 78 either during inflation of the sports ball or so as to partly or fully deflate the sports ball.

Now that a preferred embodiment of the present invention has been described in some detail, it will be apparent to those skilled in the art that the valve has at least the following advantages over the admitted prior art:

1. The valve can be actuated or opened relying on the inflating fluid pressure alone and as such an injector is not required;

2. The valve is relatively simply in construction;

3. The valve is designed and configured to reduce leakage or flow in the reverse direction; and

4. The valve can be deflated or opened by application of a predetermined force to its mounting member.

Those skilled in the art will appreciate that the invention described herein is susceptible to variations and modifications other than those specifically described. For example, the valve need not be of a one-piece construction as described and it may be fabricated from any suitable material depending on the application and working parameters. The specific shape and configuration of the valve need not be limited to that described and illustrated but rather extends to other configurations which are within the scope of the broadest aspects of the invention.

All such variations and modifications are to be considered within the scope of the present invention the nature of which is to be determined from the foregoing description.

Dated this 18th day of July 2003

Global Valve Technology Pty Ltd
By their Patent Attorneys
Blake Dawson Waldron Patent Services

PRIOR ART

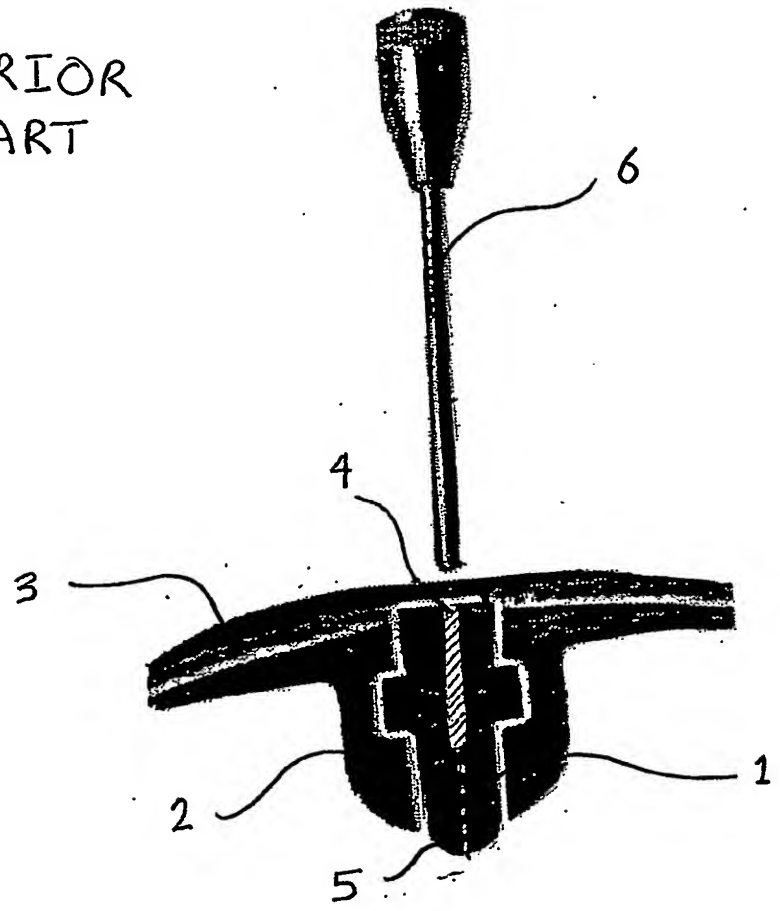


FIG. 1

PRIOR ART

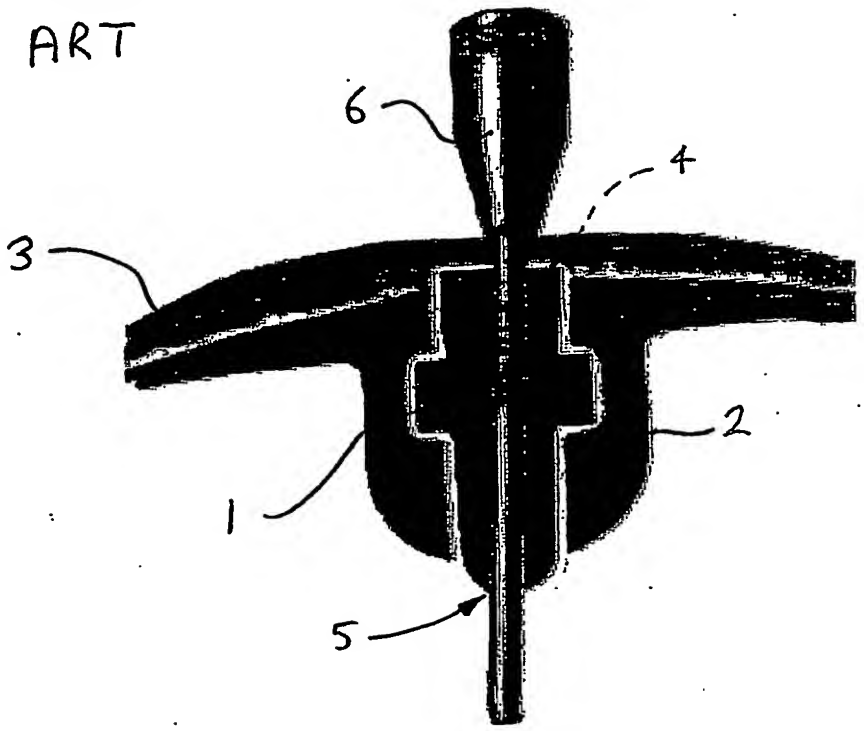


FIG. 2

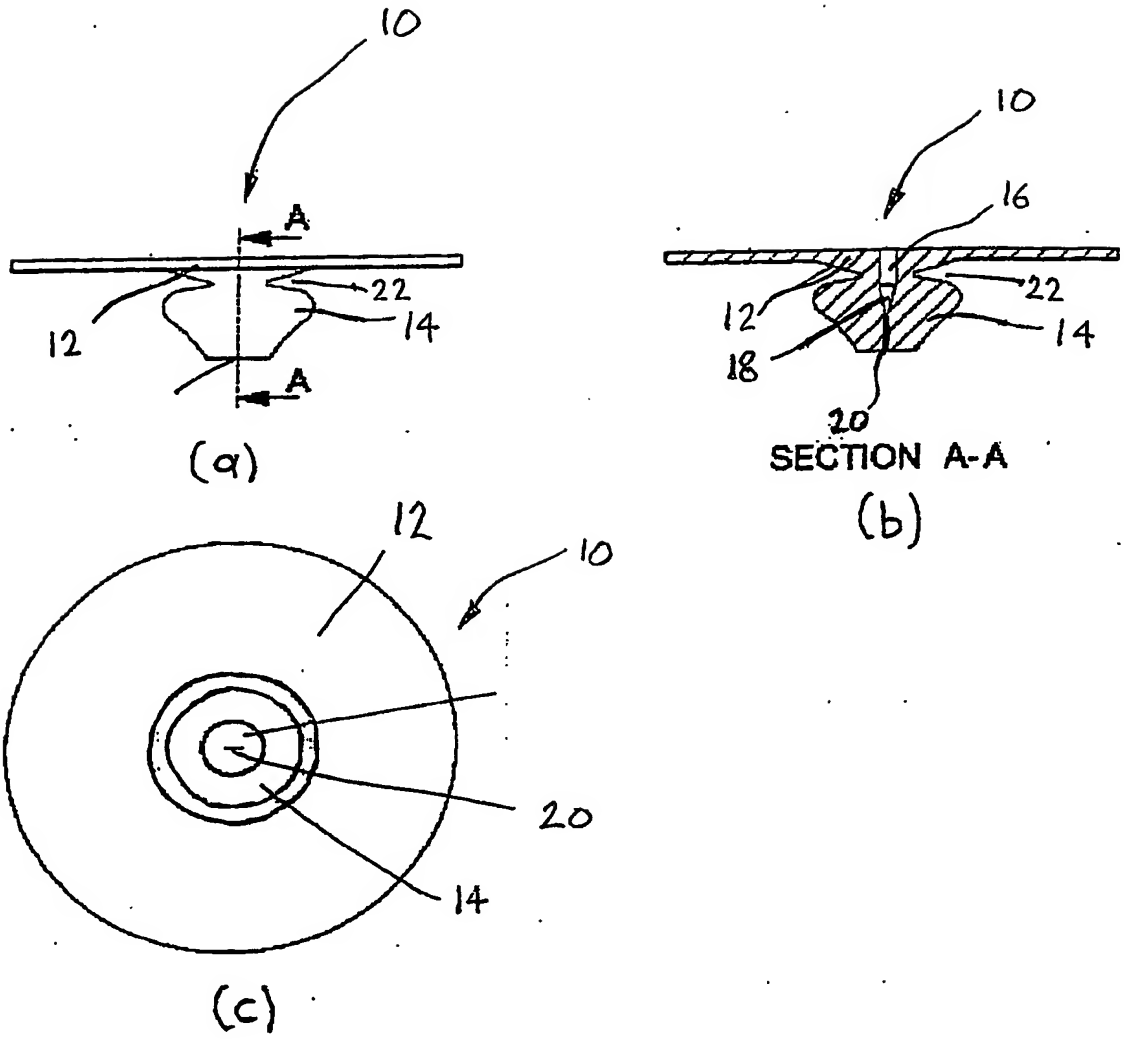
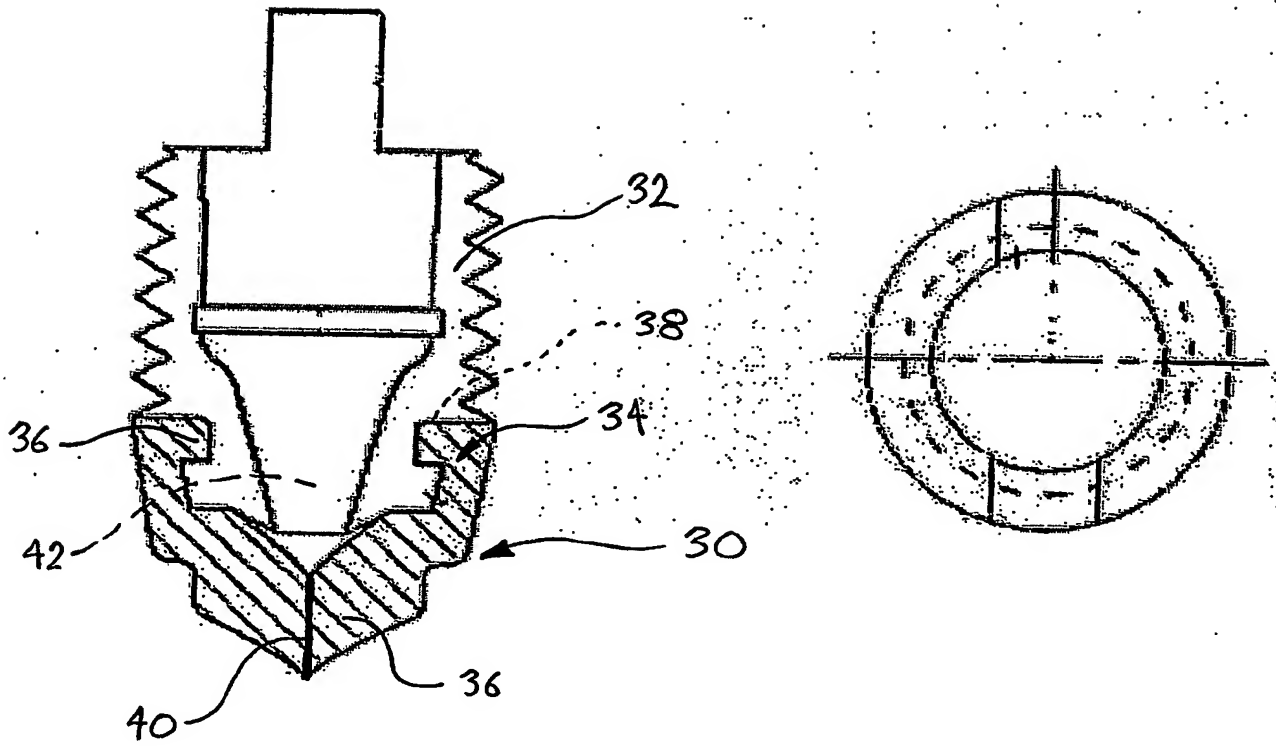


FIG. 3



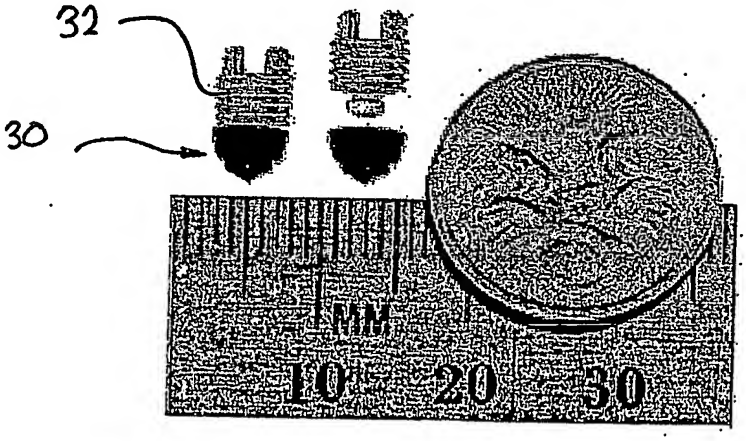


FIG. 4

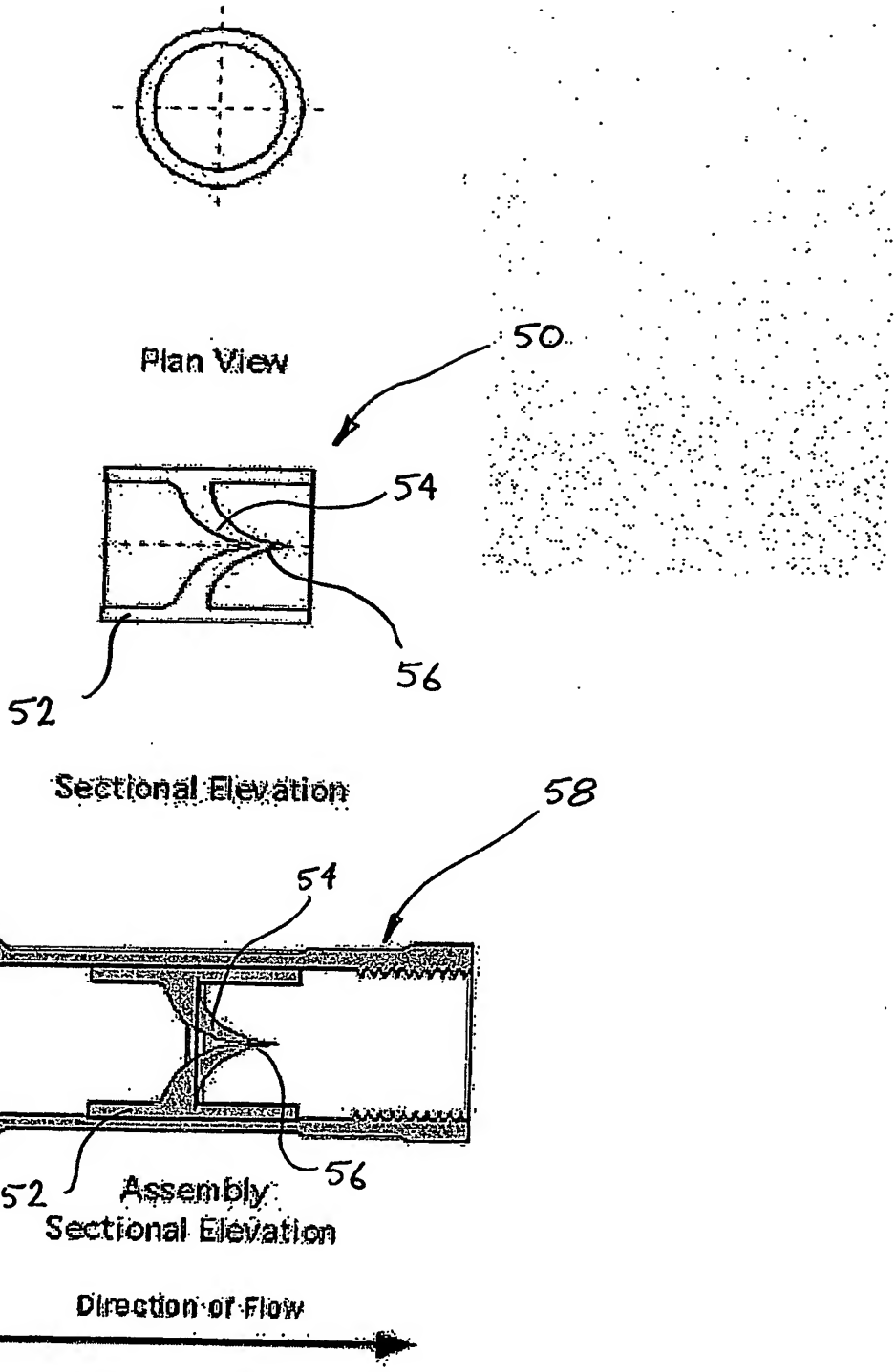

Plan View
50
54
56
52
Sectional Elevation
58
54
52
56
Assembly
Sectional Elevation
Direction of Flow

FIG. 5

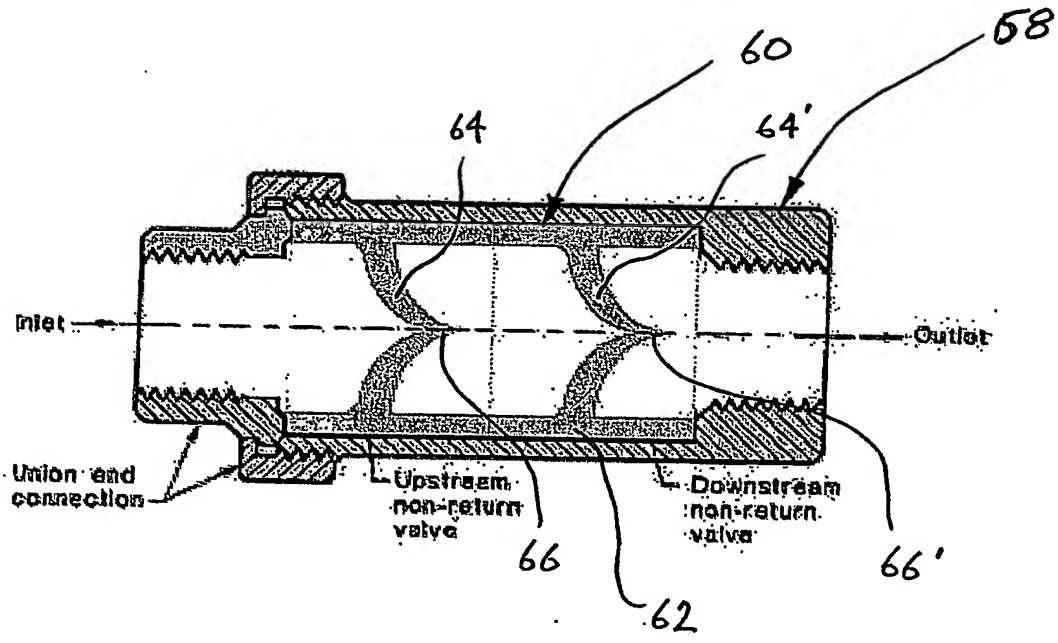

60
58
64
64'
Inlet
Outlet
Union end connection
Upstream non-return valve
Downstream non-return valve
66
66'
62

FIG. 6

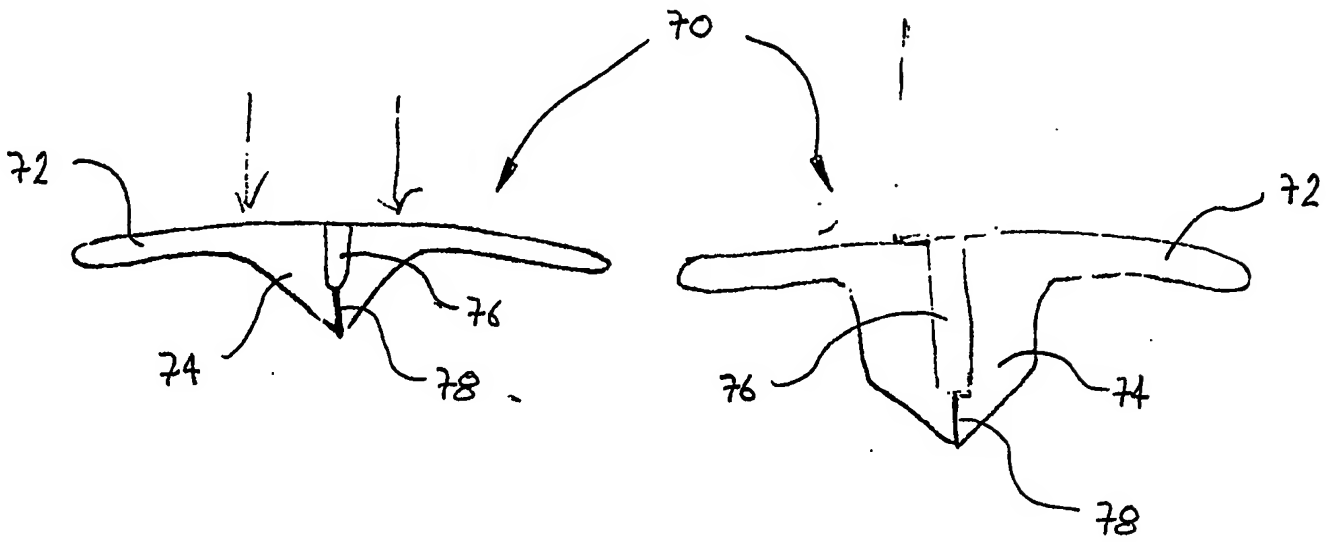


FIG. 7